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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/567,151	02/03/2006	Naoaki Ogure	062068	4226

38834 7590 04/13/2009

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EXAMINER	
BELL, BRUCE F	

ART UNIT	PAPER NUMBER
1795	

MAIL DATE	DELIVERY MODE
04/13/2009	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/567,151	OGURE ET AL.	
	Examiner	Art Unit	
	Bruce F. Bell	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-37* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-37* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *03 February 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *2/3/06; 6/8/06; 6/25/07; 9/3/08*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-10 are rejected under 35 U.S.C. 102(b) as being anticipated by Hanni et al (6306270).

Hanni et al disclose a bipolar electrode that includes a substrate and a compact diamond film which is made conductive by a doping agent and which coats the substrate. See abstract. The bipolar electrodes take the form of plates or the form of a plurality of balls, with a diameter of between 0.5 and 10 mm. See col. 1, lines 32-34. A rectangular container 10 made of insulating material, containing an electrolyte 12 is disclosed that has two end walls 101 and 102, in proximity to which are arranged an anode 14 and a cathode 16 in the form of plates parallel to each other. See col. 2, lines 12-17. The electrolytic cell is intended for treatment of wastewater. The anode 14, cathode 16 and bipolar electrodes 18 are all formed of an electrically conductive substrate, bearing the reference a, coated on both its faces, at least in the submerged portion thereof, with a diamond film b, which is doped to make it electrically conductive. See col. 2, lines 29-34. The substrate can be formed of silicon or silicon carbide, vitreous carbon or a composite material including a network of carbon fibers amalgamated with pyrolytic carbon and/or silicon carbide, zirconium, molybdenum,

tantalum, niobium, titanium and silicides thereof. See col. 2, lines 35-45. The diamond film is formed on the substrate surface by HFCVD and is made conductive by doping with boron, nitrogen or a mixture of both that is introduced during the deposition of the film. See col. 2, lines 46-55. The thickness of the conductive diamond film it between 0.1 and 1 micrometer. The bipolar electrodes are formed from a plurality of spherical particles held in suspension in the electrolyte and are arranged in the space situated above the membrane within the cell. The diameter of the spheres is between 0.5 to 10 mm. See col. 3, lines 27-32. Each bipolar electrode includes a spherical core, made of a doped silicon or silicon carbide and each sphere is totally coated with a conductive diamond film doped with boron and having a thickness of the order of 0.1 to 1 micrometer. See col. 3, lines 35-41. Spherical bipolar electrodes allow wear and pollution to be avoided, due to the coating with a diamond film. See col. 4, lines 5-7. The spherical core can also be made of materials such as doped silicon, silicon oxide, quartz, graphite, or refractory transition metal such as zirconium, molybdenum, tantalum, niobium, titanium or silicides thereof. See col. 4, lines 8-16.

The prior art of Hanni et al anticipates the applicants instant invention as shown by way of the disclosure above with respect to the instant claims as presented.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1-3, 5-10 are rejected under 35 U.S.C. 102(b) as being anticipated by Glesener et al (6267866).

Glesener et al disclose an electrode that is made of a conductive metal mesh coated with boron doped diamond that is used in electrochemical reactions as a cathode or an anode. See abstract. A conductive metal mesh substrate is coated with a boron doped diamond film having a high surface area. The metal mesh allows for enhanced mass transport of reactant when used as an electrode in an electrochemical cell. The conducting metal used as the mesh substrate improves the conductivity and energy efficiency of the electrode and the boron doped diamond coating provides enhanced dimensional stability and corrosion resistance for the mesh structure. See col. 1, lines 45-55. Conductive metals for the metal mesh include tungsten, titanium, tantalum copper and alloys of these metals. See col. 1, lines 63-65. The metal mesh provides a porous structure having a high surface area to maximize the contact of the electrode with the solution of the electrolytic cell in which the electrode is used. The grid segments or filaments are about 0.5mm to about 10 mm, in diameter. The spacing between grid segments or filaments can range from very fine to coarse. See col. 2, lines 1-7. The conductive metal mesh may be coated with boron doped diamond by FACVD. See col. 2, lines 8-12. The electrode has a wide potential window and can be used as an anode to oxidize reactants or as a cathode to reduce reactants. See col. 2, lines 19-24. The boron doped diamond can be deposited on tungsten mesh (75 mm x 32.5 mm), using a FACVD process. The boron doped diamond coating completely covers the links of the mesh with a relative uniform thickness of 35 to 40 micrometers. See example 1.

In example 2, the electrode is prepared by coating titanium mesh substrates (10 mm x 20 mm) with approximately 10 micrometers of boron doped diamond via microwave plasma enhanced CVD to achieve uniform nucleation and good film adhesion.

The prior art of Glesener et al anticipates the applicants instant invention as shown by way of the disclosure above with respect to the instant claims as presented. The recitation in the claims with respect to the electrode material assemblage having at least two of the electrode materials appears to have been met since the patent to Glesener et al sets forth that these materials can be used for the anode and cathode of the electrochemical cell and since the cell has an anode, cathode and an electrolyte, when the cell is assembled, the two electrodes are in contact through the electrolyte. The support is considered to be that of the metal mesh on which the boron doped diamond layer is supported. Therefore, the prior art of Glesener et al anticipates the applicants instant invention as set forth above.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 11-25 are rejected under 35 U.S.C. 102(b) as being anticipated by Iida et al (5900127).

Iida et al disclose an electrode for electrolysis having an electrode base material and an electrode substance having an electrically conductive diamond structure

covering the surface of the electrode base material. The electrode substance having an electrically conductive diamond structure may be a diamond containing an impurity selected from boron, phosphorus and graphite. The electrically conductive diamond structure may be that of a composite of a diamond and an electrically conductive material. The electrode may further have an interlayer having at least on of the carbide of a valve metal and silicon carbide disposed between the electrode base material and the electrode substance having an electrically conductive diamond structure. At least one of an anode or cathode is made of the structure above. See abstract. The electrode base metal is that of a valve metal and the interlayer is formed between the electrode base metal and the electrode substance having an electrically conductive diamond material. The electrode interlayer can be that of a carbide of a valve metal and/or silicon carbide covering the surface of the electrode valve metal and an electrode substance having an electrically conductive diamond covers the surface of the interlayer. See col. 5, lines 14-20. The layer of the cover layer on the base material is from about 0.1 micrometers to about 50 micrometers to prevent the electrolytic solution from penetrating into the base material. See col. 6, lines 1-7. The base material may function as a collector and is made of materials such as titanium, niobium, tantalum, silicon, carbon, nickel, tungsten carbide, etc and the base material maybe in the form of a wire gauze, a sintered powder, sintered metal, fibers, etc.. The interlayer used between the electrode base material and the electrode substance serves to more strongly bind the base material with that of the electrode substance having an electrically conductive diamond structure. See col. 7, lines 3-7 and 31-37. The surface of the cover layer which

is the electrode substance having an electrically conductive diamond structure can be further covered with a second electrode substance. See col. 7, lines 57-60. The electrode substance may be applied onto the surface of the underlayer by known thermal decomposition method. After coating a solution of a mixture of iridium chloride and butyl tantalate as a coating liquid on the surface of the interlayer followed by drying, thermal decomposition is carried out. See col. 8, lines 8-13. Example 1 shows producing an electrically conductive diamond structure by thermal CVD, wherein a thin diamond layer having a thickness of 10 micrometers is formed on a porous graphite plate having a thickness of 2mm and surface area of 1 cm^2 (i.e. 10 mm x 10 mm plate). Example 2 shows a diamond layer having a thickness of 10 micrometers and containing boron was formed by CVD on a porous metal plate made of titanium mesh having an electrode area of 1 cm^2 (10 mm x 10 mm) and a thickness of 1 mm to provide an anode. Example 13 shows plasma flame coating titanium carbon particles on the surface of a titanium base material, with a titanium carbide interlayer having a thickness of 50 micrometers being formed on the surface of the base material and then covering the interlayer with an electrode substance.

Iida et al anticipates the applicants instant invention as set forth above with respect to the instant claims as presented. The recitation in the claims with respect to the polymer being used is set forth as a butyl tantalite which is dried and then thermal decomposition is performed meaning that the temperature is raised and then lowered after the decomposition is finished.

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. Claim 26-30, 34 are rejected under 35 U.S.C. 102(e) as being anticipated by Nishibayashi et al (7026750).

Nishibayashi et al disclose an electron emission element that comprises a substrate and a protrusion protruding from the substrate and including boron doped diamond. The protrusion comprises a columnar body. See abstract. The electron emission element comprises a substrate made of diamond whereas a protrusion 14 of the diamond protrudes from the substrate 11. A columnar part 12 constituting the lower part of the protrusion 14 is formed like a circular cylinder having a side face substantially perpendicular to the surface of the substrate 11. The upper part of the protrusion 14 is constituted by an acute part 13 having a needle at the leading end. Electrons are emitted from this needle. The diamond constituting the protrusion 14 and substrate 11 are doped with boron. See col. 13, lines 17-29.

The prior art of Nishibayashi et al anticipates the applicants instant invention as shown by way of the disclosure above with respect to the instant claims as set forth. Since the electron emission element is an electrode material and is electrically

conductive due to doping of the diamond and is completely made of electrically conductive diamond, it appears that the columnar surface of the electrically conductive diamond meets the limitation with respect to the substrate being coated, since it is the surface being doped with boron that makes the diamond electrically conductive and therefore, the surface being treated is considered by the examiner to be a type of coating. Further since the column is electrically conductive diamond, it appears that the coating thickness would be inherently met. The examiner considers the substrate and the columnar portions of the device to be two electrode materials that are in electrical contact with at least one another and therefore this aspect of the invention appears to have been met. Further the electrode assemblage due to the substrate and columnar portions being connected is met by virtue of the two parts being connected to one another. Therefore, the prior art of Nishibayashi et al anticipates the applicants instant invention as set forth. The rejection above is proper until such time as applicant submits an English translation of the foreign priority documents to overcome the rejection.

Claim Rejections - 35 USC § 102

9. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

10. Claims 26-37 are rejected under 35 U.S.C. 102(b) as being anticipated by Puetter et al (6533916).

Puetter et al disclose a diamond coated electrode. See abstract. The diamond layer is made electrically conductive by introducing boron into the surface of the diamond layer. See col. 5, lines 28-41. The substrate can be that of a carbide, silicide or boride. See col. 5, lines 53-59. The thickness of the diamond layer is in the range of from 1 to 50 micrometers. See col. 6, lines 5-7. The diamond electrode can be in planar form or in cylindrical form such as that of a candle shape. See col. 6, lines 34-38. The electrode is disclosed to be used in an electrochemical cell having an electrolyte solution. See col. 7, lines 8-67.

The prior art of Puetter et al anticipates the applicants instant claims as shown by way of the disclosure above with respect to the instant claims as presented. Since electrochemical cells have at least two electrodes and they are connected in circuit with an electrolyte, the recitation with respect to at least two electrodes with one electrode in electrical contact with at least one other electrode has been met. Further, since electrochemical cells are liquid processors when using an electrolytic solution, this aspect of the invention has been met, as well as using the diamond electrode in the method of processing a liquid.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Bruce F. Bell whose telephone number is 571-272-1296. The examiner can normally be reached on Monday-Friday 6:30 AM - 3:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on 571 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

BFB
April 10, 2009

/Bruce F. Bell/
Primary Examiner, Art Unit 1795